

DATA SHEET

BFG67; BFG67/X; BFG67/XR NPN 8 GHz wideband transistors

Product specification
Supersedes data of September 1995

1998 Oct 02

NPN 8 GHz wideband transistors

BFG67; BFG67/X; BFG67/XR

FEATURES

- High power gain
- Low noise figure
- High transition frequency
- Gold metallization ensures excellent reliability.

APPLICATIONS

Wideband applications in the GHz range, such as satellite TV tuners and portable RF communications equipment.

DESCRIPTION

NPN silicon transistor in a 4-pin, dual-emitter SOT143B plastic package. Available with in-line emitter pinning (BFG67) and cross emitter pinning (BFG67/X). Version with reverse pinning (BFG67/XR) also available on request.

MARKING

TYPE NUMBER	CODE
BFG67 (Fig.1)	V3
BFG67/X (Fig.1)	V12
BFG67/XR (Fig.2)	V26

PINNING

PIN	DESCRIPTION		
	BFG67	BFG67/X	BFG67/XR
1	collector	collector	collector
2	base	emitter	emitter
3	emitter	base	base
4	emitter	emitter	emitter

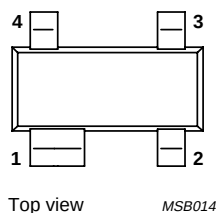


Fig.1 Simplified outline SOT143B.

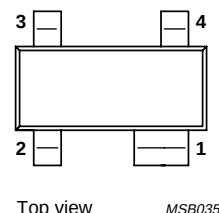


Fig.2 Simplified outline SOT143R.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_{CE0}	collector-emitter voltage	open base	—	10	V
I_C	collector current (DC)		—	50	mA
P_{tot}	total power dissipation	$T_s \leq 65^\circ\text{C}$	—	300	mW
C_{re}	feedback capacitance	$I_C = i_c = 0$; $V_{CB} = 8\text{ V}$; $f = 1\text{ MHz}$	0.5	—	pF
f_T	transition frequency	$I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 500\text{ MHz}$	8	—	GHz
G_{UM}	maximum unilateral power gain	$I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$; $T_{amb} = 25^\circ\text{C}$; $f = 1\text{ GHz}$	17	—	dB
F	noise figure	$\Gamma_s = \Gamma_{opt}$; $I_C = 5\text{ mA}$; $V_{CE} = 8\text{ V}$; $T_{amb} = 25^\circ\text{C}$; $f = 1\text{ GHz}$	1.3	—	dB
		$\Gamma_s = \Gamma_{opt}$; $I_C = 5\text{ mA}$; $V_{CE} = 8\text{ V}$; $T_{amb} = 25^\circ\text{C}$; $f = 2\text{ GHz}$	2.2	—	dB

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LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V _{CBO}	collector-base voltage	open emitter	–	20	V
V _{CEO}	collector-emitter voltage	open base	–	10	V
V _{EBO}	emitter-base voltage	open collector	–	2.5	V
I _C	collector current (DC)		–	50	mA
P _{tot}	total power dissipation	T _s ≤ 65 °C; see Fig.3; note 1	–	380	mW
T _{stg}	storage temperature range		–65	150	°C
T _j	junction temperature		–	175	°C

Note

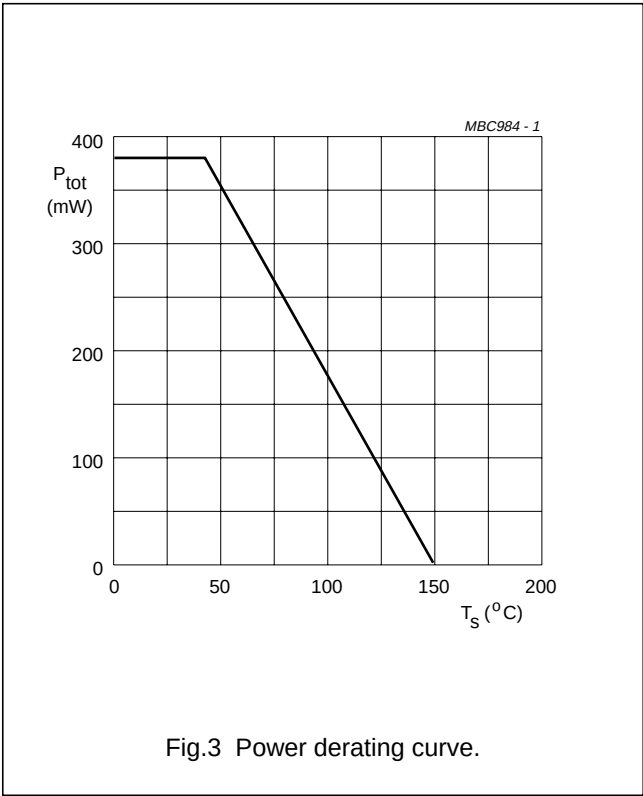
1. T_s is the temperature at the soldering point of the collector pin.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R _{th j-s}	thermal resistance from junction to soldering point	note 1	290	K/W

Note

1. T_s is the temperature at the soldering point of the collector pin.



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CHARACTERISTICS

$T_j = 25\text{ °C}$ unless otherwise specified.

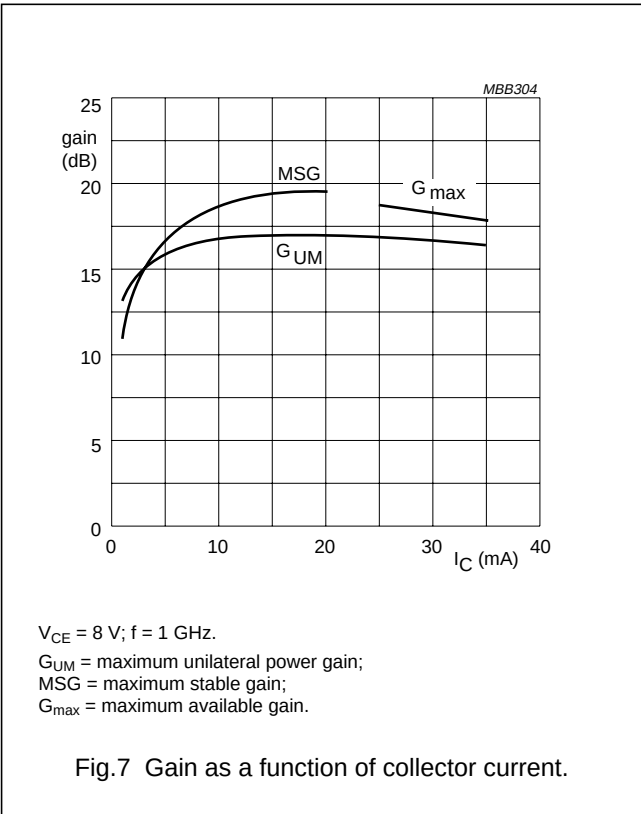
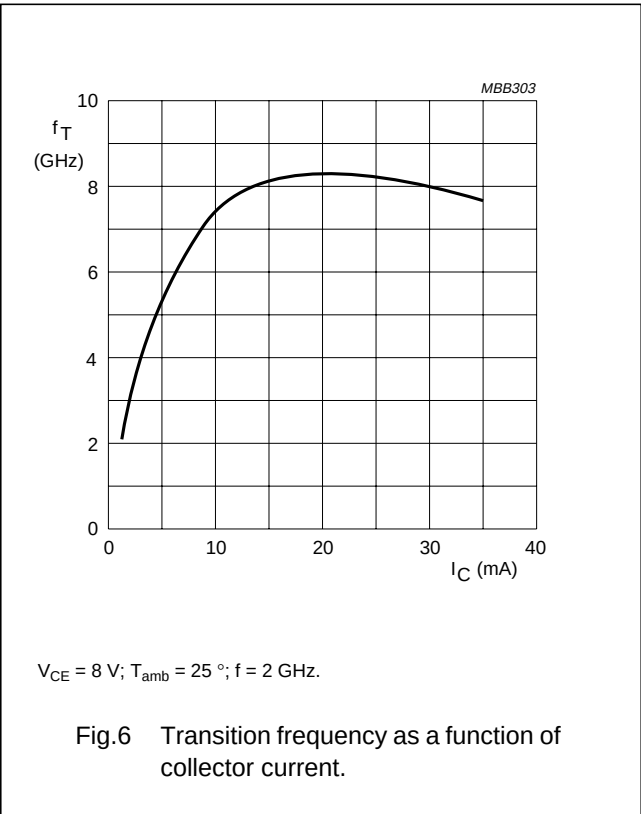
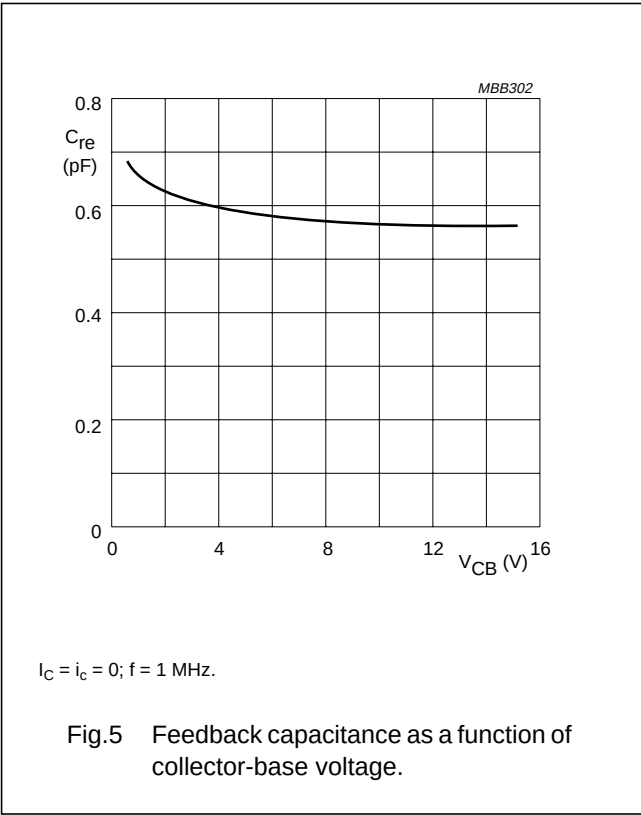
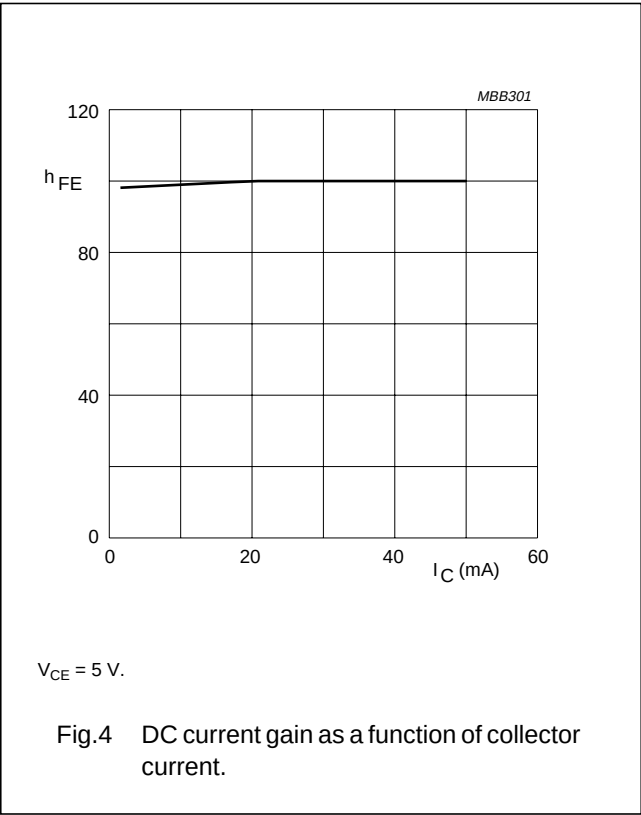
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector leakage current	$V_{CB} = 5\text{ V}; I_E = 0$	–	–	50	nA
h_{FE}	DC current gain	$I_C = 15\text{ mA}; V_{CE} = 5\text{ V}$	60	100	–	
f_T	transition frequency	$I_C = 15\text{ mA}; V_{CE} = 8\text{ V}; f = 500\text{ MHz}$	–	8	–	GHz
C_c	collector capacitance	$I_E = i_e = 0; V_{CB} = 8\text{ V}; f = 1\text{ MHz}$	–	0.7	–	pF
C_e	emitter capacitance	$I_C = i_c = 0; V_{EB} = 0.5\text{ V}; f = 1\text{ MHz}$	–	1.3	–	pF
C_{re}	feedback capacitance	$I_C = i_c = 0; V_{CB} = 8\text{ V}; f = 1\text{ MHz}$	–	0.5	–	pF
G_{UM}	maximum unilateral power gain; note 1	$I_C = 15\text{ mA}; V_{CE} = 8\text{ V}; T_{amb} = 25\text{ °C}; f = 1\text{ GHz}$	–	17	–	dB
		$I_C = 15\text{ mA}; V_{CE} = 8\text{ V}; T_{amb} = 25\text{ °C}; f = 2\text{ GHz}$	–	10	–	dB
F	noise figure	$\Gamma_S = \Gamma_{opt}; I_C = 5\text{ mA}; V_{CE} = 8\text{ V}; T_{amb} = 25\text{ °C}; f = 1\text{ GHz}$	–	1.3	–	dB
		$\Gamma_S = \Gamma_{opt}; I_C = 15\text{ mA}; V_{CE} = 8\text{ V}; T_{amb} = 25\text{ °C}; f = 1\text{ GHz}$	–	1.7	–	dB
		$I_C = 5\text{ mA}; V_{CE} = 8\text{ V}; T_{amb} = 25\text{ °C}; f = 2\text{ GHz}; Z_S = 60\text{ }\Omega$	–	2.5	–	dB
		$I_C = 15\text{ mA}; V_{CE} = 8\text{ V}; T_{amb} = 25\text{ °C}; f = 2\text{ GHz}; Z_S = 60\text{ }\Omega$	–	3	–	dB

Note

1. G_{UM} is the maximum unilateral power gain, assuming S_{12} is zero and $G_{UM} = 10 \log \frac{|S_{21}|^2}{(1 - |S_{11}|^2)(1 - |S_{22}|^2)}$ dB.

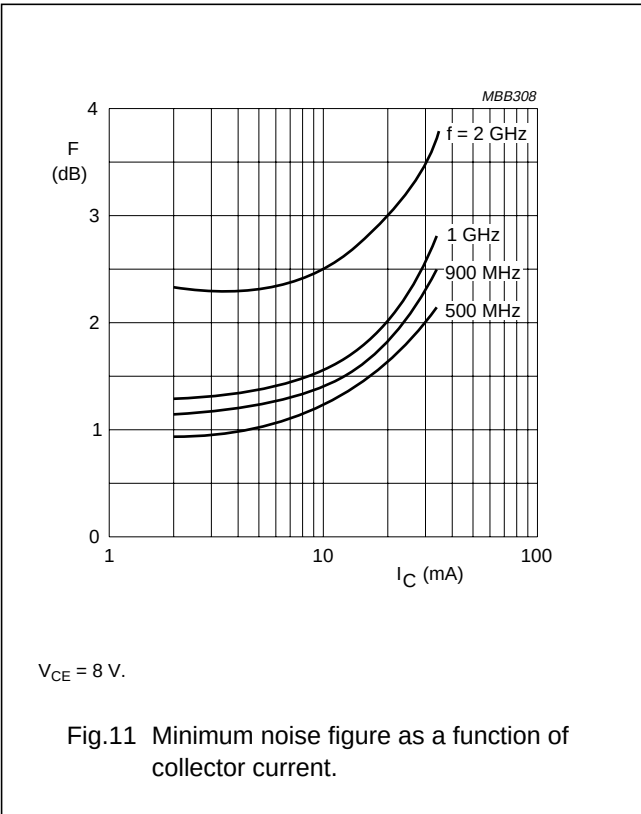
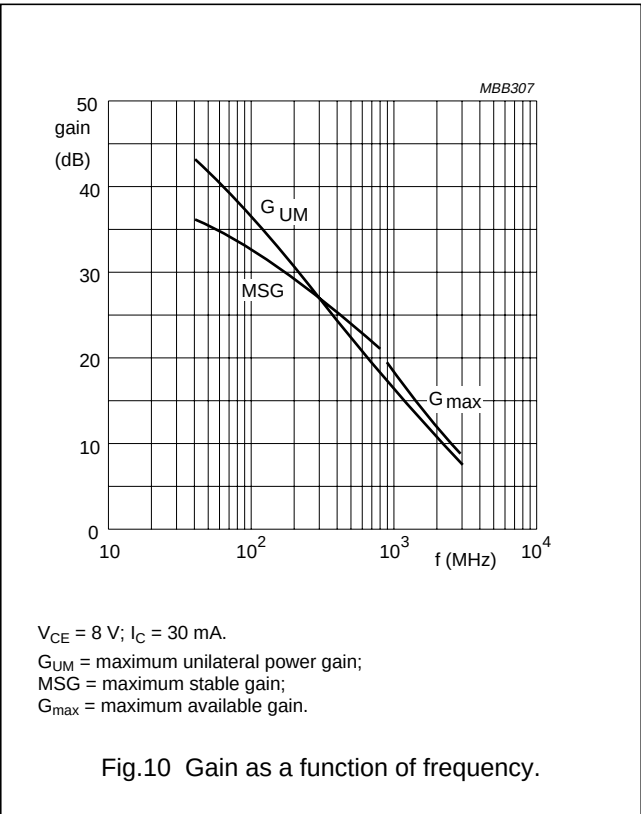
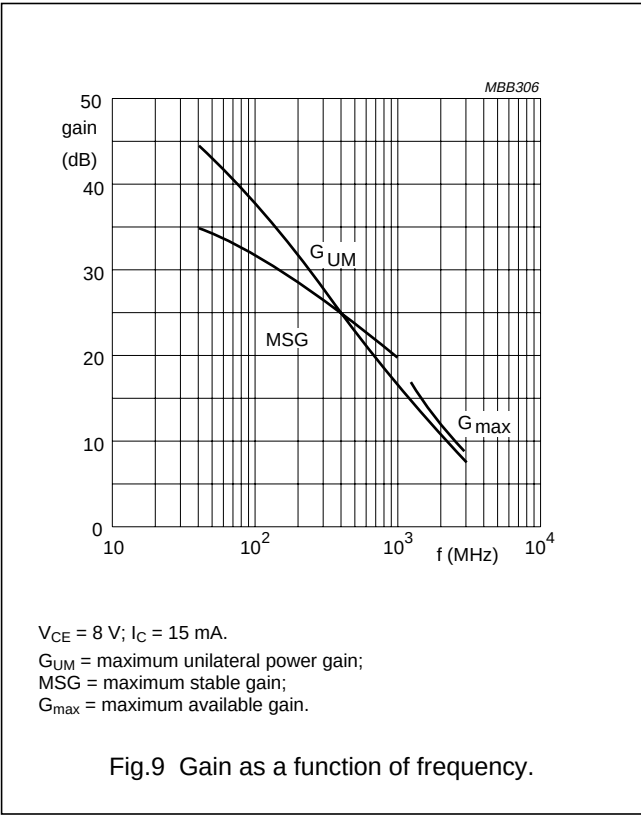
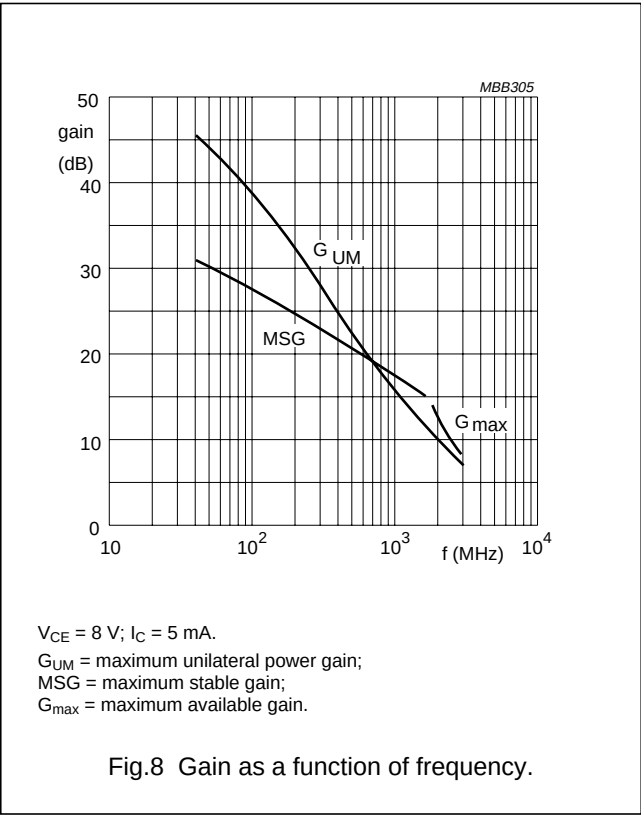
NPN 8 GHz wideband transistors

BFG67; BFG67/X; BFG67/XR



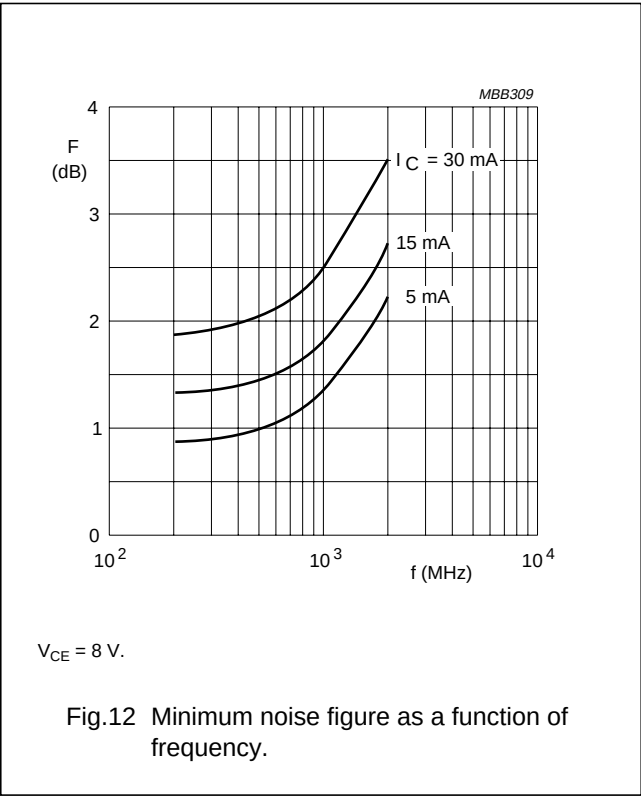
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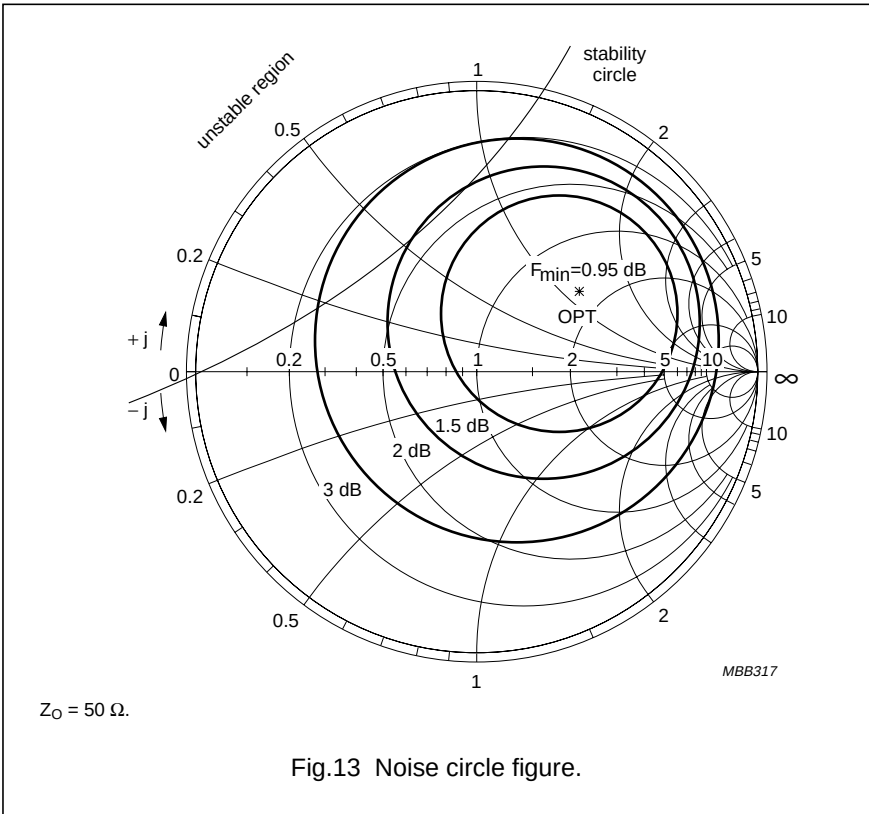


BFG67/X

f (MHz)	V_{CE} (V)	I_C (mA)
500	8	5

Noise Parameters

F_{min} (dB)	Gamma (opt)		$R_n/50$
	(mag)	(ang)	
0.95	0.455	33.8	0.288



NPN 8 GHz wideband transistors

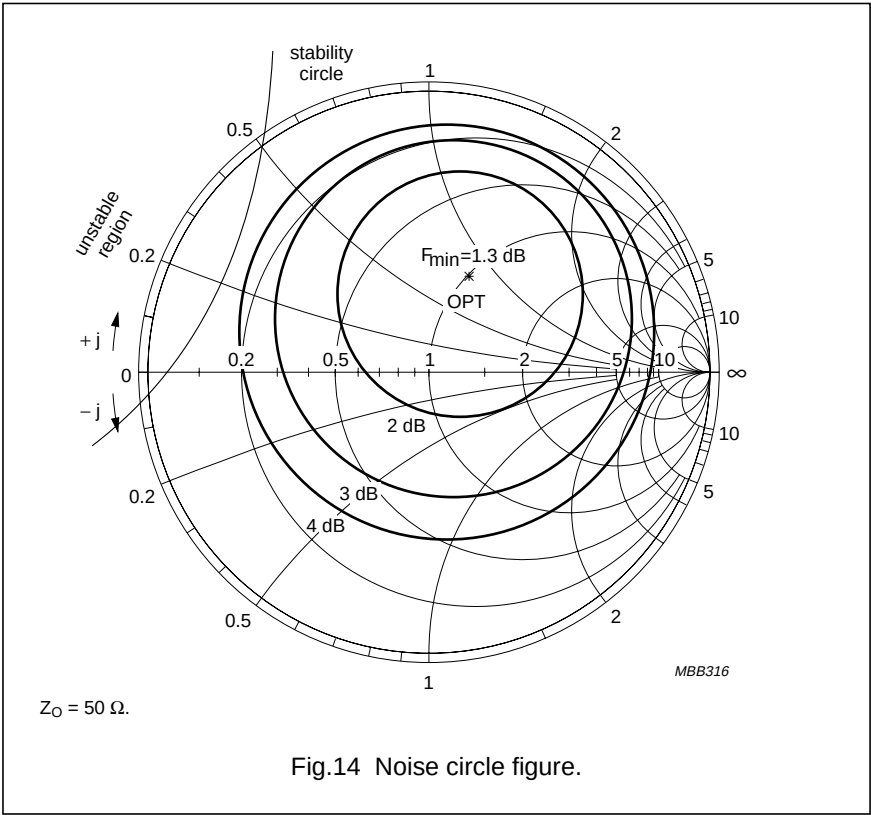
BFG67; BFG67/X; BFG67/XR

BFG67/X

f (MHz)	V _{CE} (V)	I _C (mA)
1000	8	5

Noise Parameters

F _{min} (dB)	Gamma (opt)		R _n /50
	(mag)	(ang)	
1.3	0.375	65.9	0.304



BFG67/X

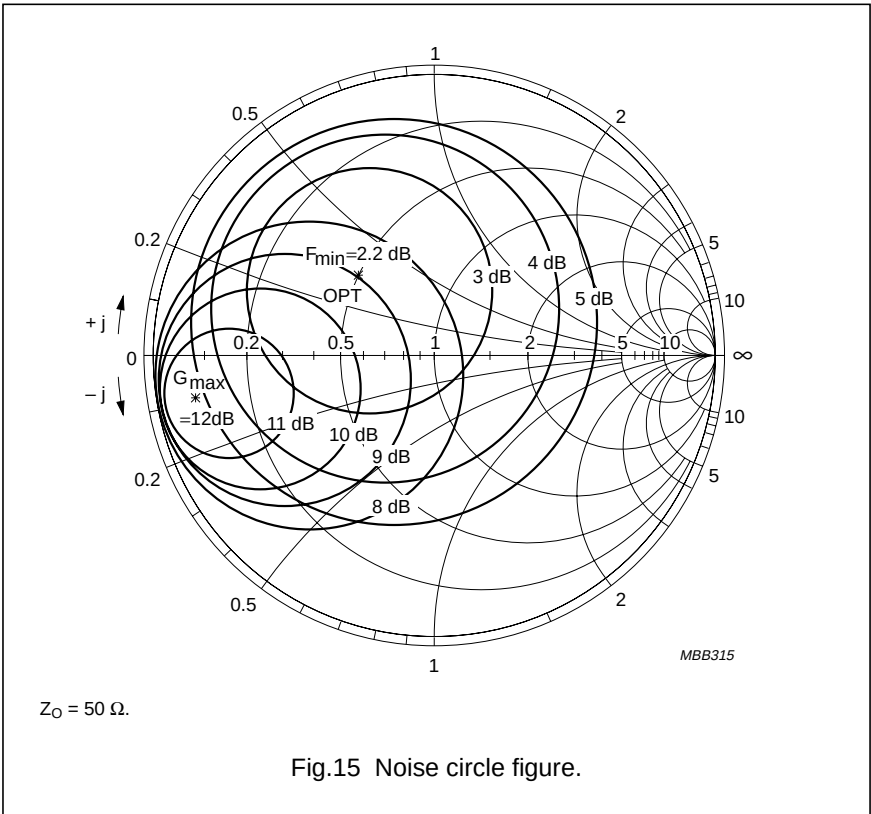
f (MHz)	V _{CE} (V)	I _C (mA)
2000	8	5

Noise Parameters

F _{min} (dB)	Gamma (opt)		R _n /50
	(mag)	(ang)	
2.2	0.391	136.5	0.184

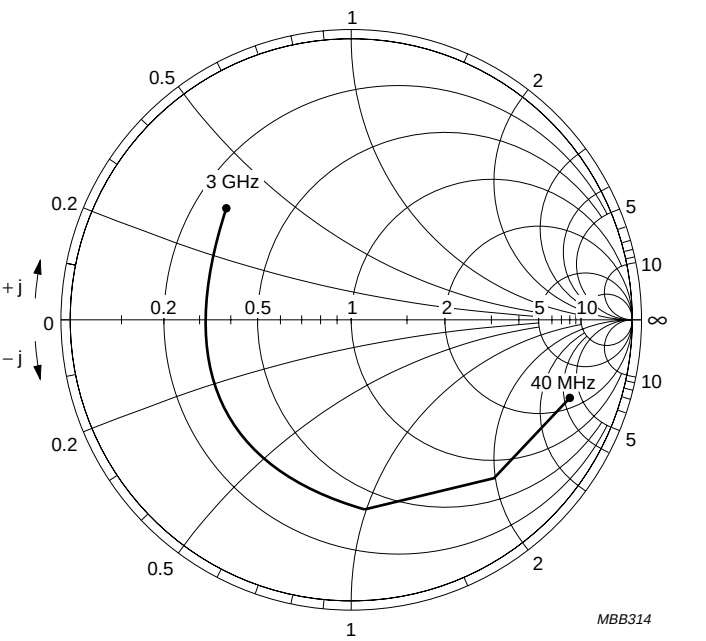
Average Gain Parameters

G _{MAX} (dB)	Gamma (max)	
	(mag)	(ang)
12	0.839	-170



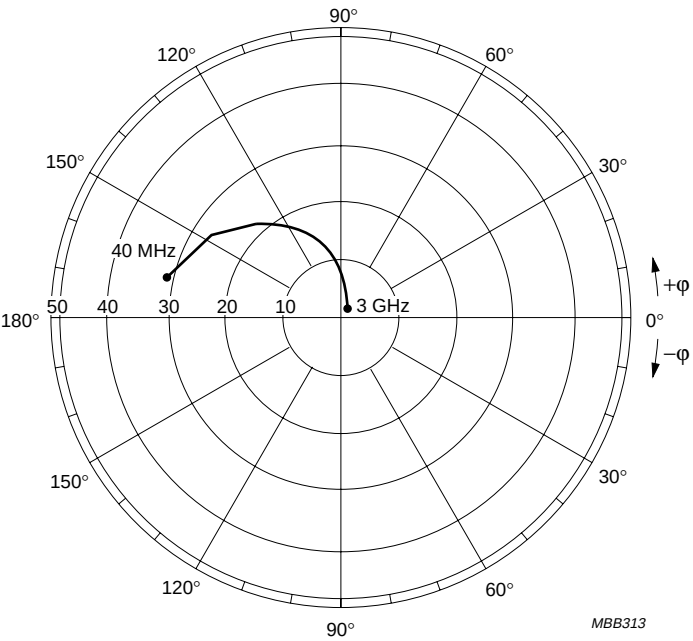
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$V_{CE} = 8\text{ V}$; $I_C = 15\text{ mA}$; $Z_O = 50\ \Omega$.

Fig.16 Common emitter input reflection coefficient (S_{11}).

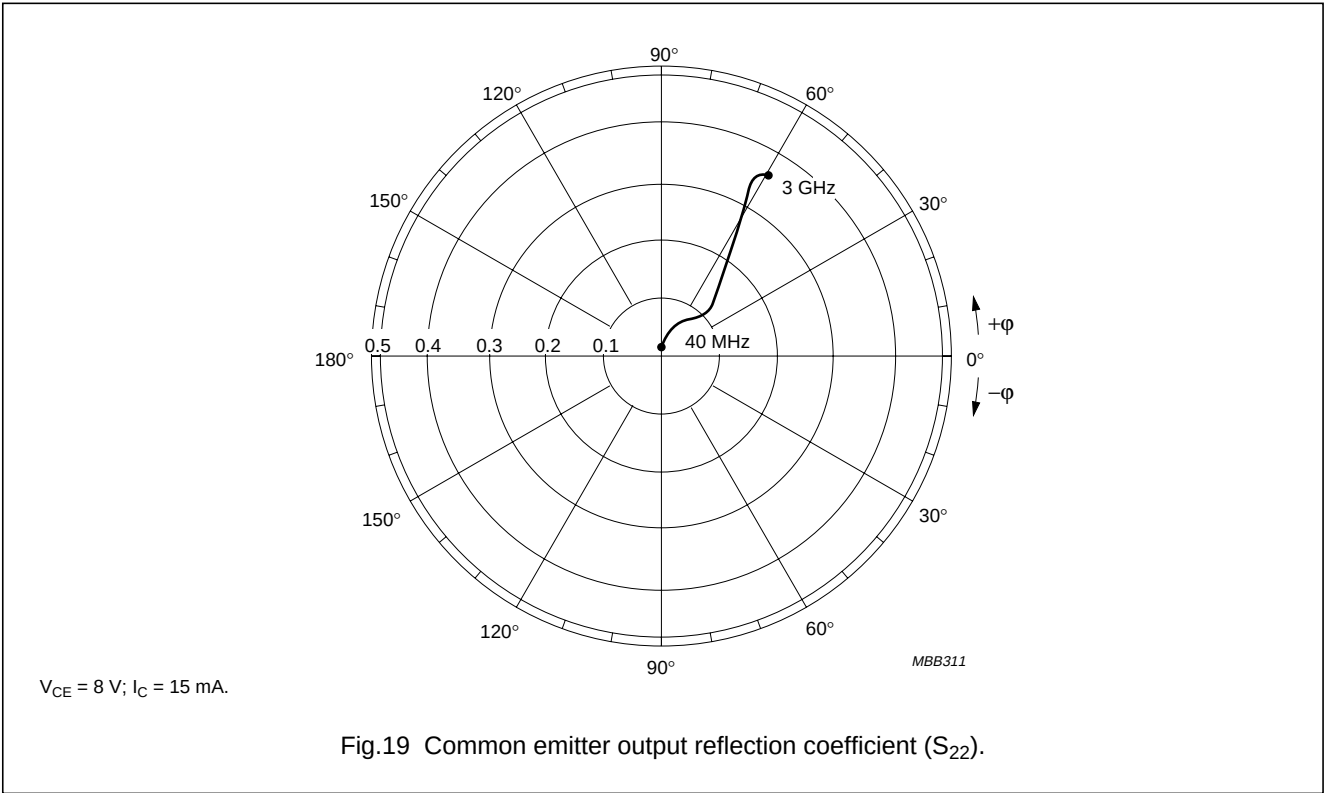
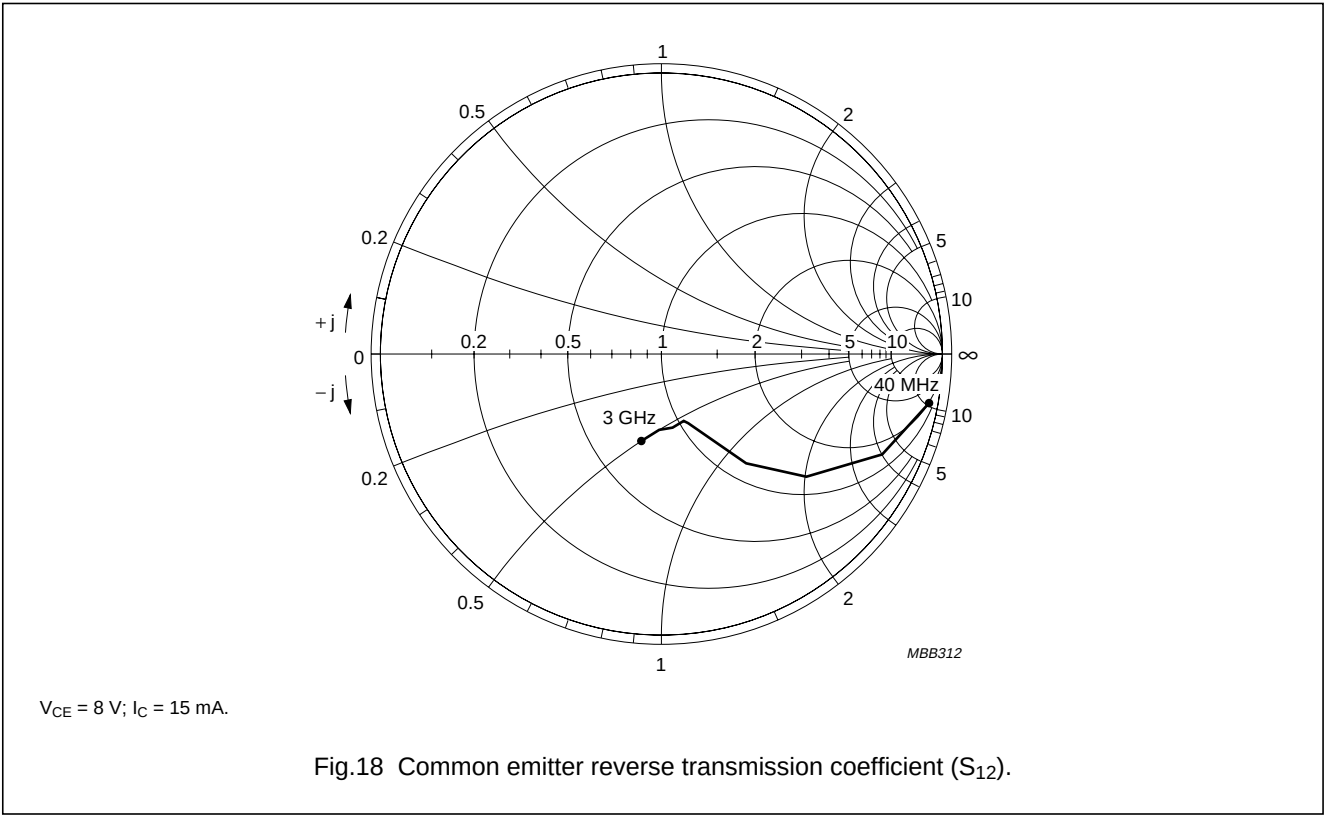


$V_{CE} = 8\text{ V}$; $I_C = \text{mA}$; $Z_O = 50\ \Omega$.

Fig.17 Common emitter forward transmission coefficient (S_{21}).

NPN 8 GHz wideband transistors

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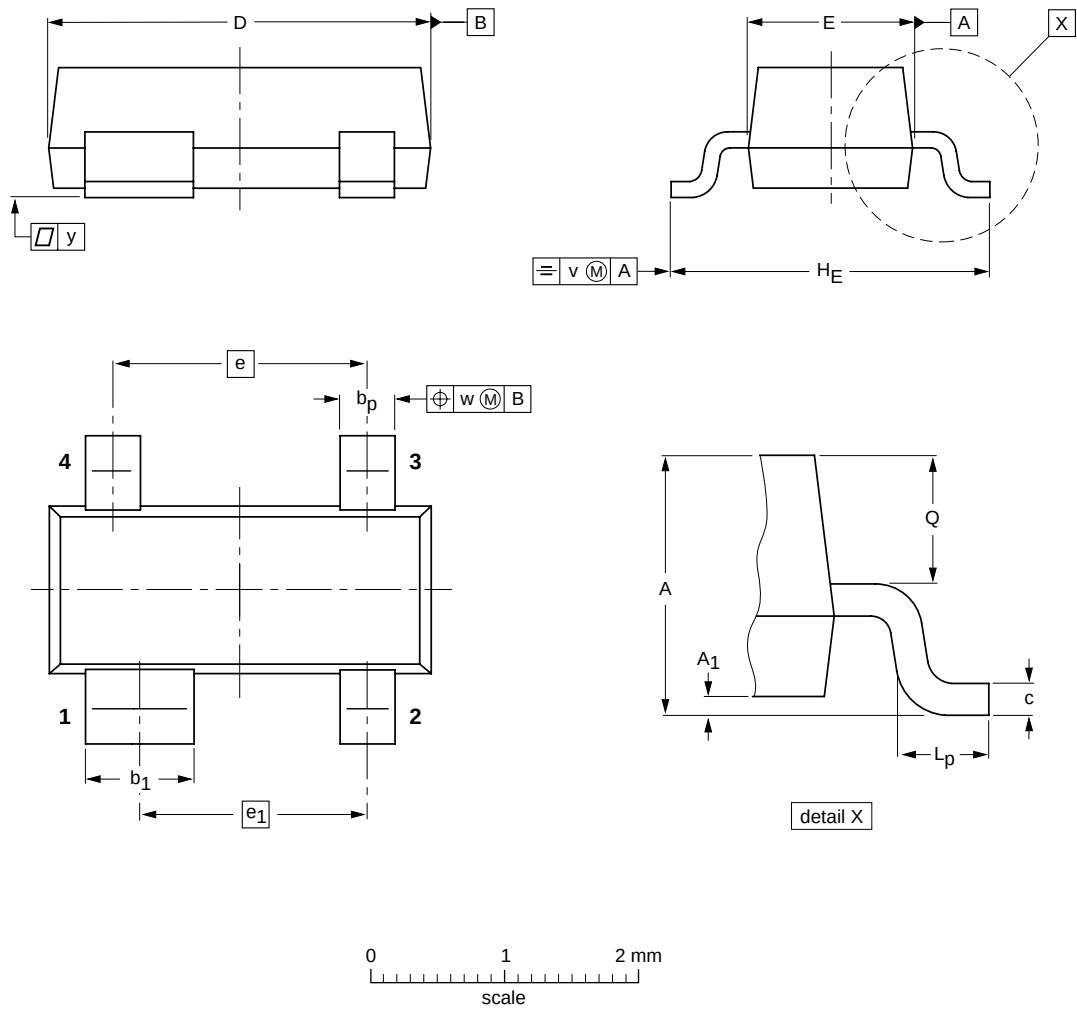
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BFG67; BFG67/X; BFG67/XR

PACKAGE OUTLINES

Plastic surface mounted package; 4 leads

SOT143B



DIMENSIONS (mm are the original dimensions)

UNIT	A	A1max	bp	b1	c	D	E	e	e1	HE	Lp	Q	v	w	y
mm	1.1 0.9	0.1	0.48 0.38	0.88 0.78	0.15 0.09	3.0 2.8	1.4 1.2	1.9	1.7	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1	0.1

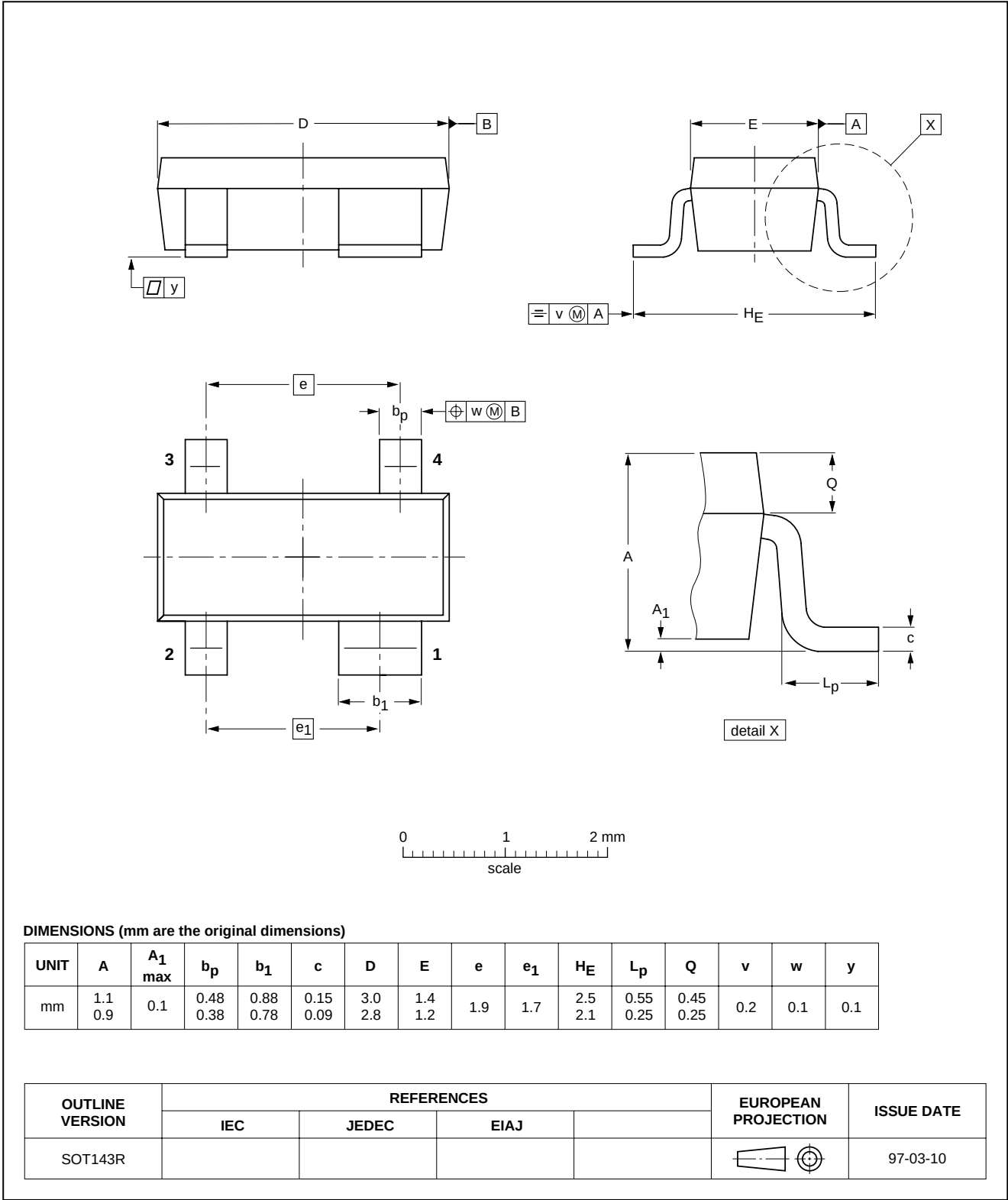
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT143B						97-02-28

NPN 8 GHz wideband transistors

BFG67; BFG67/X; BFG67/XR

Plastic surface mounted package; reverse pinning; 4 leads

SOT143R



NPN 8 GHz wideband transistorsBFG67; BFG67/X; BFG67/XR

DEFINITIONS

Data Sheet Status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

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NOTES

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NOTES

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